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RMRS Rocky Mountain Remediation Services, L.L.C.
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RMRS Health and Safety Plan for the 1996 WARP

April 1996

ROCKY FLATS ENVIRONMENTAL TECHNOLOGY SITE

INFORMATION ONLY

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Title

RMRS
Health and Safety Plan
for the
1996 Well Abandonment and
Replacement Program

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4/4/96
Date

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ABBREVIATIONS, ACRONYMS, AND INITIALISMS

ACGIH	American Conference of Governmental Industrial Hygienists
AHA	Activity Hazard Analysis
ALARA	as low as reasonably achievable
ANSI	American National Standards Institute
BZ	Breathing Zone
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CGI	Combustible Gas Indicator
cm^2	square centimeters
CNS	central nervous system
COC	chain-of-custody
conc	concentration
cpm	counts per minute
CPR	cardiopulmonary resuscitation
CTD	cumulative trauma disorders
D&D	decontamination and decommissioning
DAC	derived-air concentration
dBA	decibels on the A-weighted scale
DOE	Department of Energy
dpm	disintegrations per minute
EMRG	Environmental Management Radiological Guideline
EPA	U.S. Environmental Protection Agency
ER	Environmental Restoration
eV	electron volts
EZ	Exclusion Zone
FID	Flame Ionization Detector
FIDLER	Field Instrument for Detection of Low-Energy Radiation
FY	fiscal year
g/g	gram per gram
HASP	Health and Safety Plan

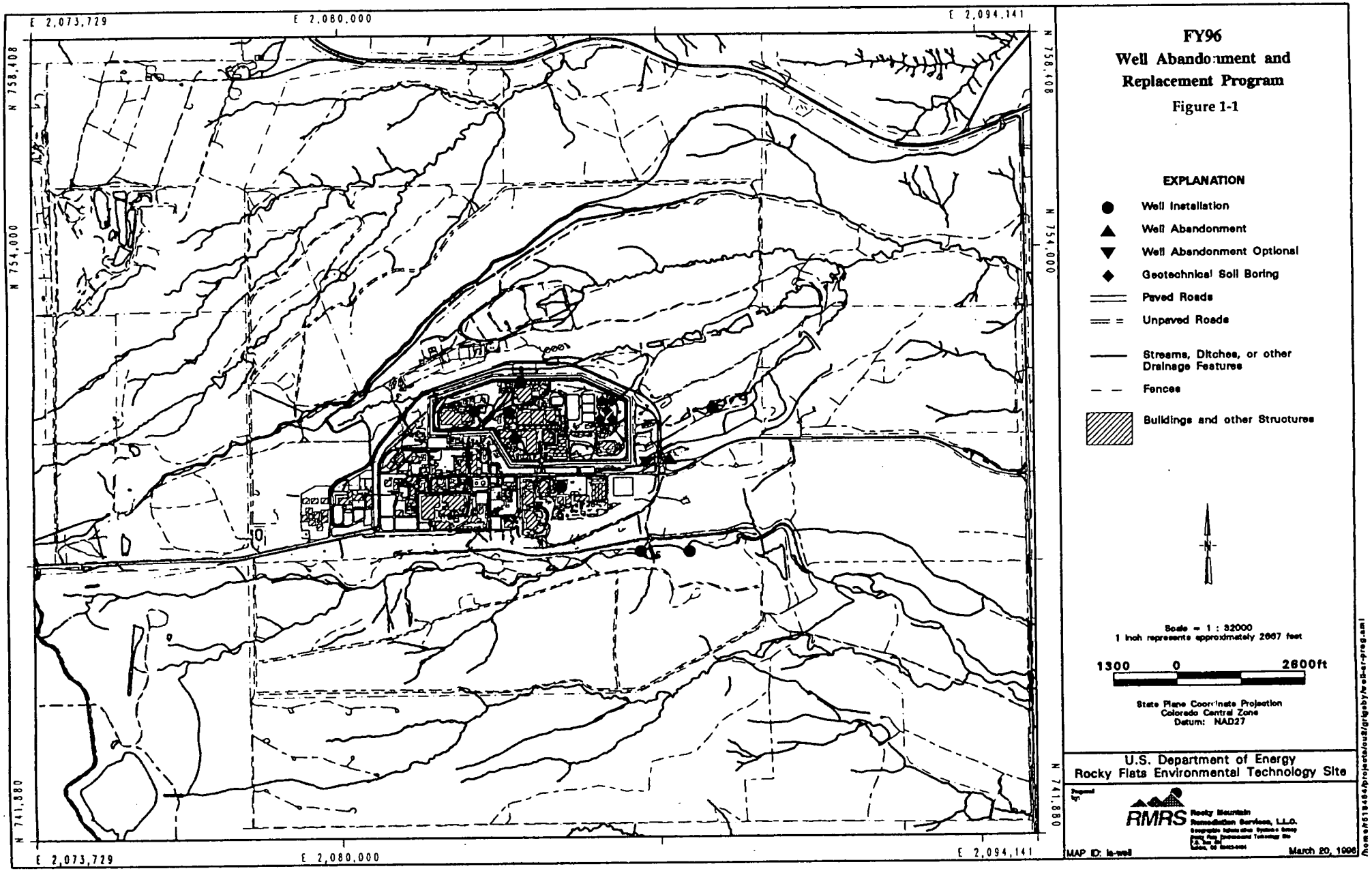
HCA	High Contaminated Area
HEPA	High Efficiency Particulate Air
HiVol	High Volume
H&S	Health and Safety
HSP	Health and Safety Practices
HSS	Health and Safety Specialist
IA	Industrial Area
IDLH	immediately dangerous to life and health
IH	industrial hygiene
IHSS	individual hazardous substance sites
IM/IRA	interim measure/interim remedial action
IP	inhalable particles
IWCP	integrated work control package
LEL	lower exposure limit
mg/kg	milligrams per kilogram
L/min	liters per minute
mg/l	milligrams per liter
mg/m	milligrams per meter
mg/m^3	milligrams per cubic meter
mg/m^2	milligrams per square meter
min.	minimum
mm	millimeter
mrem/hr	millirem per hour
MSDS	Material Safety Data Sheet
MSHA	Mine Safety and Health Administration
N/A	not applicable
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
OP	Operating Procedure
PA	Protected Area
PCB	Polychlorinated Biphenyl

pCi/g	picocuries per gram
PEL	permissible exposure level
PID	photoionization detector
PPE	personal protective equipment
ppm	parts per million
PVC	polyvinyl chloride
P/WRE	property/waste release evaluation
RCM	Radiological Control Manual
RCRA	Resource Conservation and Recovery Act
RE	Radiological Engineering
REL	recommended exposure limit
RFETS	Rocky Flats Environmental Technology Site
RMRS	Rocky Mountain Remediation Services
ROI	Radiological Operations Instructions
RR	Readiness Review
RWP	Radiological Work Permit
STEL	short-term exposure limit
SZ	support zone
TLV	threshold limit value
UEL	upper explosive limit
UNK	unknown
VOC	Volatile Organic Compound
WARP	Well Abandonment and Replacement Program
WBGT	Wet-Bulb Globe Temperature
µCi/ml	microcuries per milliliter
mg/g	milligrams per gram

1.0 INTRODUCTION

This Health and Safety Plan (HASP) presents requirements and guidelines for work at the Rocky Flats Environmental Technology Site (RFETS). It is in compliance with applicable sections of 29 Code of Federal Regulations (CFR) 1910.120 and 1926.65, Hazardous Waste Operations and Emergency Response, 10 CFR 835 Occupational Radiation Protection, and the Rocky Flats Plant Radiological Control Manual.

This HASP has been written for use by Rocky Mountain Remediation Services, L.L.C., (RMRS) for use by RMRS employees and any other individuals authorized to access areas where site control is established to conduct field work. The health and safety (H&S) guidelines in this plan were prepared specifically for the Fiscal Year 1996 (FY96) Well Abandonment and Replacement Program (WARP) and should not be used on any other project without prior research by trained H&S professionals. The scope of work described in the FY96 WARP Work Plan is composed of four tasks: (1) abandon eleven wells to assist with source removal accelerated actions in Individual Hazardous Substance Sites (IHSSs) 110 and 113; (2) install up to five wells for compliance with the Interim Measure/Interim Remedial Action (IM/IRA) Implementation Plan for the Rocky Flats Industrial Area (IA) (DOE 1995); (3) install three Tier II monitoring wells under the RFETS Action Level Framework for Surface Water, Groundwater, and Soils (DOE 1996 and DOE 1996); and (4) drill five geotechnical boreholes for soils engineering testing for the proposed mixed-waste hazardous management unit east of the solar ponds. Locations for the four tasks are shown in Figure 1-1. The general H&S requirements for work on this project are described in the main body of this HASP. Task specific hazards and controls, as well as task specific personnel protective equipment are described in Appendix A.


E 2,073,729
E 2,080,000
E 2,094,141
N 758,408
N 754,000
N 741,880
FY96
Well Abandonment and
Replacement Program
Figure 1-1
EXPLANATION
Well Installation
Well Abandonment
Well Abandonment Optional
Geotechnical Soil Boring
Paved Roads
Unpaved Roads
Streams, Ditches, or other Drainage Features
Fences
Buildings and other Structures
Scale = 1 : 32000
1 inch represents approximately 2667 feet
1300 0 2600ft
State Plane Coordinate Projection
Colorado Central Zone
Datum: NAD27
U.S. Department of Energy
Rocky Flats Environmental Technology Site
RMRS
MAP ID: fa-well
March 20, 1996

2.0 FACILITY CHARACTERISTICS

The following text discusses the facility description, history, and physical features.

2.1 FACILITY DESCRIPTION

RFETS is located northwest of Denver, Colorado. The plant consists of approximately 6,550 acres of federally owned land. Major process buildings are located within a Protected Area (PA) of approximately 400 acres. The PA is surrounded by a buffer zone of approximately 6,150 acres. The entire facility is bound by State Highway 93 on the west, State Highway 128 on the north, Indiana Street on the east, and State Highway 72 on the south. The general facility layout, roads, buildings, and structures are shown on the RFETS General Map shown in Figure 1-1.

2.2 FACILITY HISTORY

RFETS began operations in 1952 and is currently under the administration of Department of Energy (DOE) as part of the nationwide nuclear weapons complex undergoing environmental restoration and hazard reduction. Previous production activities consisted of: fabrication of nuclear weapons components from beryllium, plutonium, stainless steel, and uranium; assembly of components; and chemical recovery and purification of recyclable transuranic radionuclides. Wastes generated at the plant include hazardous waste, radioactive waste, low-level and transuranic mixed (radioactive and hazardous) waste, refuse, and sanitary waste.

The U.S. Environmental Protection Agency (EPA) published the final decision to add RFETS to the National Priority List in the October 4, 1989 *Federal Register*. Cleanup at RFETS is being conducted under two major environmental laws: (1) the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA, better known as Superfund), which addresses inactive and radioactive areas; and (2) the Resource Conservation and Recovery Act (RCRA), which addresses past and active storage and disposal areas. The present mission at RFETS is plutonium stabilization, decontamination and decommissioning (D&D), environmental restoration and waste management.

2.3 PHYSICAL FEATURES

The natural environment of RFETS and vicinity is influenced primarily by its proximity to the Front Range of the Rocky Mountains. The plant is directly east of the Rocky Mountains at an elevation of approximately 6,000 feet above sea level. RFETS is located on a broad, eastward-sloping pediment surface. The pediment surface is comprised of an alluvial fan deposit known as the Rocky Flats Alluvium. The operational area of the plant is located near the eastern extent of the Rocky Flats Alluvium which is dissected by eastward trending stream-cut valleys (Walnut Creek and Woman Creek).

3.0 FIELD OPERATIONS ADMINISTRATION

This section identifies project organization and personnel responsibilities for the management and implementation of this HASP.

3.1 RFETS PERSONNEL

The RFETS H&S personnel and their responsibilities are shown in Figure 3-1 and listed below.

3.1.1 RMRS Project Manager/Site Manager

The project manager's duties include:

- Managing the development and implementation of the site-specific HASP.
- Performing periodic onsite inspections to ensure that the HASP is being followed.
- Coordinating with the H&S supervisor on H&S issues.
- Ensuring that site or task-specific Activity Hazard Analyses (AHAs) are written.
- Ensuring that resources are available for all H&S requirements.

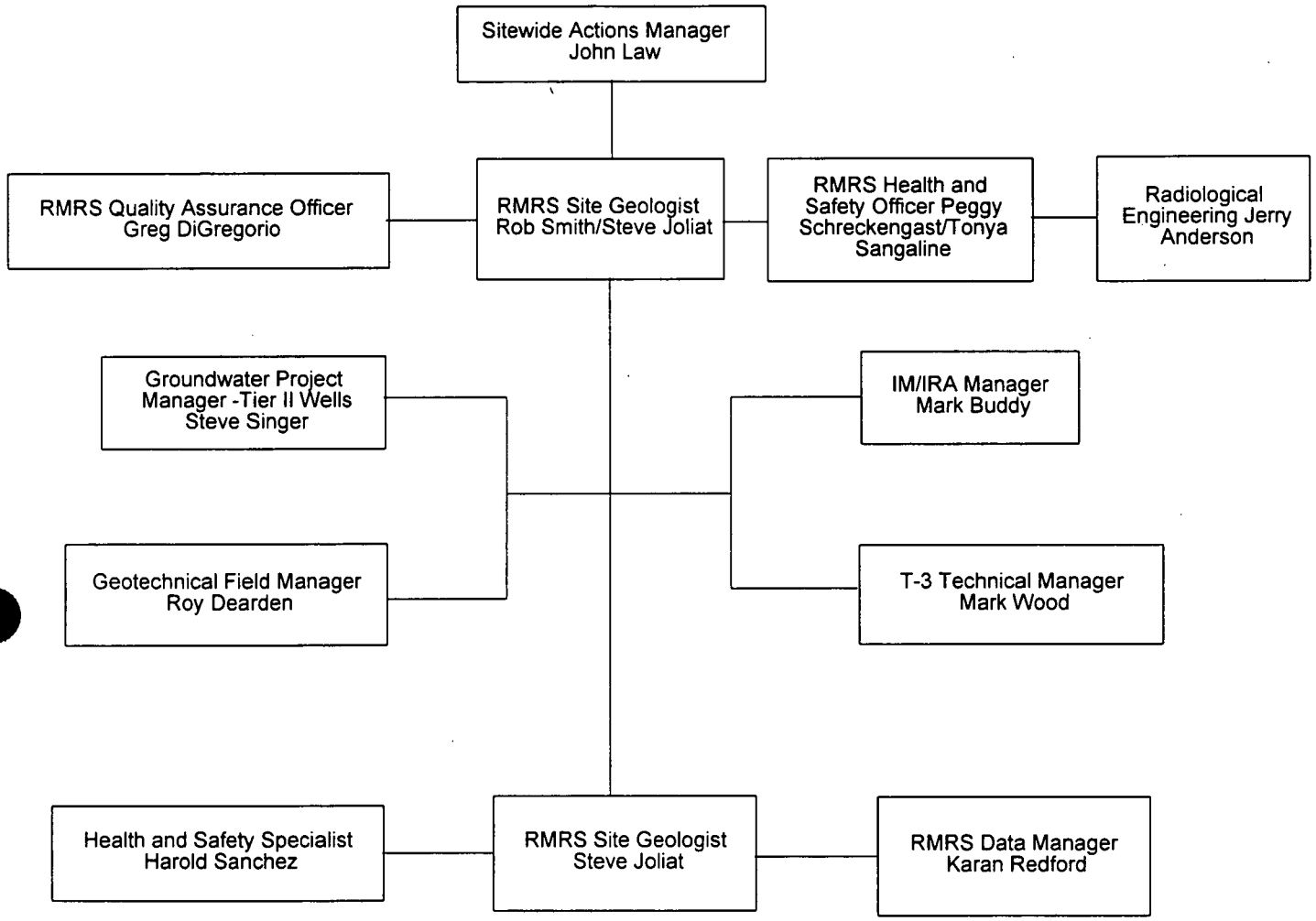
3.1.2 H&S Supervisor

The H&S supervisor's duties include:

- Managing and implement the H&S Program.
- Providing support to Environmental Restoration (ER) project managers.
- Coordinating review of HASPs as required.

Figure 3-1

WELL ABANDONMENT AND REPLACEMENT PROGRAM
PROJECT ORGANIZATION



- Performing review and approval of HASP field changes.

- Evaluating RMRS and subcontractor work to verify compliance with the requirements of the HASP.

- Performing inspections for proper and appropriate use of personal protective equipment (PPE), monitor and decontamination procedures, site control, and all required documentation.

- Alerting the task project manager and the H&S manager of H&S violations.

3.1.3 Radiological Engineering (RE)

The REs duties include:

- Anticipating, recognizing, and evaluating radiological health hazards, and recommending control measures as necessary (engineering controls shall be emphasized);

- Performing inspections to determine compliance with HASPs;

- Ensuring, in conjunction with Industrial Hygiene (IH) and ER, that site characterization and analysis, in accordance with 29 CFR 1910.120(c), is performed to identify specific site radiological hazards at work sites and to determine if the necessary H&S control procedures are implemented to protect personnel from the identified hazards;

- Ensuring, in conjunction with IH and ER, that appropriate site control procedures are implemented before cleanup work begins to control personnel exposure to radiological hazards;

- Providing technical review of all HASPs, AHAs, integrated work control packages (IWCPs), and procedures as necessary; and

- Implementing radiological protection programs.

3.1.4 Health and Safety Specialist (HSS)

The HSS is a subcontractor whose responsibilities are to:

- Assist the project manager and site manager in implementing the HASP.
- Provide a copy of the HASP to all field crews.
- Maintain all site H&S records and immediately report all safety-related incidents or accidents to the project manager.
- Direct H&S activities onsite and conduct staff training and orientation for these activities.
- Ensure that current medical clearance and training documentation is available.
- Ensure that each individual within the HSS's area of responsibility complies with the provisions of this plan, and document safety practices.
- Conduct prescreening for field radiological measurements to approve the area for fieldwork in Level D or modified Level D PPE.
- Audit safety practices used by onsite teams.
- Provide onsite air monitoring for radiological and chemical contaminants during field activities (as required) using personal and real-time instrumentation as outlined in this HASP.
- Monitor workers for heat or cold stress, and distribute H&S equipment.
- Oversee contamination exposure reduction.

- Suspend work or otherwise limit personnel exposures if this HASP appears to be unsuitable or inadequate, if personnel H&S is endangered, or when he/she feels a work condition is radiologically unsafe.

- Direct personnel to change work practices if they are deemed to be hazardous to H&S.

- Remove personnel from projects if their actions endanger their H&S or the H&S of others, or the environment.

- Implement emergency procedures as required.

- Implement radiological guidelines and coordinate activities to limit radiation exposures to levels that are as low as reasonably achievable (ALARA).

3.1.5 Site Manager/Site Geologist

The site manager or site geologist is responsible for all administrative tasks in support of the project manager. The duties include (1) ensuring job site safety and implementing the HASP, (2) making certain that the scope of work as described in the FY96 WARP Work Plan are met, (3) informing facility personnel of activities that will be carried out in a particular area, (4) ensuring site permits are obtained before work begins at each site, (5) communicating with the HSS about the schedule of work, and (6) verifying training/medical documentation and releases.

3.2 PROJECT PERSONNEL

Project personnel are required to follow the guidance of the HASP and to report all injuries to the HSS, H&S supervisor, and project manager. Project personnel have the right to know hazards, report concerns or violations, refuse work due to unsafe conditions, access H&S information, make input regarding H&S issues, access PPE, and participate in the Site HASP as administered by RMRS.

4.0 GENERAL H&S REQUIREMENTS

This section discusses the H&S training, briefings, and medical monitoring requirements for site personnel.

4.1 PERSONNEL TRAINING REQUIREMENTS

All site personnel are required to be trained in accordance with the 29 CFR 1910.120(e) and 10 CFR 835(j), and the Radiological Control Manual (RCM).

4.1.1 Preassignment Training

All field employees must complete the 40-hour basic H&S training required under 29 CFR 1910.120(e) and an eight-hour annual refresher training course thereafter. Certificates verifying completion of these training courses will be maintained in the site H&S files for each individual working onsite.

4.1.2 Supervisor Training

Onsite managers and supervisors directly responsible for employees engaged in hazardous waste operations must be trained as specified in 29 CFR 1910.120 (e)(4). This training includes additional hours of training specifically for hazardous waste operations supervisors.

The HSSs and site manager/geologist must complete the basic 40-hour training course; three days of on-the-job training, and at least eight hours of supervisor training, which is specialized training for managing hazardous waste operations. The eight hours of specialized training will include instruction covering the RFETS H&S program, employee training program, PPE program, emergency response and spill containment procedures, and health hazard monitoring procedures and techniques.

4.1.3 Three-Day Supervised Field Experience

All field employees will be required to receive a minimum of three days (for a total of 24-hours) of actual field experience under the direct supervision of an experienced supervisor. Supervised onsite field

experience time will be documented in the Site manager's logbook and on a data sheet to be kept in the individual's onsite H&S file.

4.1.4 Site-Specific Safety Orientation Meeting

The HSS will conduct a site-specific safety orientation meeting for all field employees, including subcontractors before authorization of individual access to areas where site control is established. The HSS will document attendance and the topics discussed. The following topics will be discussed at this meeting:

- Names of H&S personnel and alternates responsible for site H&S;
- H&S organization;
- Locations where the site-specific HASP can be found;
- Hazards at the site;
- Hazard communication program;
- Exposure risk;
- PPE to be used;
- Personnel and equipment decontamination procedures;
- Air monitoring;
- Emergency procedures;
- Employee rights and responsibilities;
- Disciplinary procedures;
- Alcohol and drug abuse policy;
- Procedures for reporting and correcting unsafe conditions;
- Procedures for reporting accidents and incidents;
- Fire prevention and control; and
- Access to employee exposure data and medical records.

Field personnel will be briefed on this HASP, and will be given the opportunity to read it at any time. All field personnel must sign the safety compliance agreement form stating that they have been briefed on the HASP, and agree to comply with the provisions therein.

When new personnel have been assigned to the project, the HSS must present a similar briefing before he or she participates in any field activities. All new project personnel must sign the safety compliance agreement form before beginning fieldwork.

4.1.5 Daily Tailgate Meetings

The HSS shall conduct daily H&S tailgate meetings before field team personnel perform field work. The HSS will document attendance and the topics discussed, including:

- Any hazards of the specific work to be performed that day that were not previously discussed;
- Discussion and resolution of any H&S concerns or problems since the previous tailgate meeting;
- Evacuation routes and emergency signals; and
- Daily meetings may be augmented by additional meetings if warranted.

4.2 HAZARD COMMUNICATION PROGRAM

4.2.1 Hazard Communication Training

The HSS will present Hazard Communication training in accordance with RFETS policy. The goal of the training is to provide employees with the knowledge to work safely, be aware of potential hazards, and be able to implement appropriate precautions when working with hazardous chemicals. Training will comply with 29 CFR 1910.1200 Hazard Communication:

4.2.2 Warning Labels and MSDS

In compliance with RMRS Hazardous communication policy, the HSS will ensure that all chemical products are appropriately labeled and will obtain an Material Safety Data Sheet (MSDS) for all such products. Employees may obtain copies of MSDSs from the HSS for chemical products used in the workplace.

The label on products in original containers must contain the following:

- Appropriate hazard warning;
- Contents of the container;
- Name, address, and emergency telephone number of the chemical manufacturer.

Secondary containers must be labeled with the identity of the hazardous chemical and appropriate hazard warnings.

4.2.3 Communication of H&S Concerns

If H&S concerns arise during field activities, the following steps should be taken:

- H&S concerns in the field shall be brought to the attention of the HSS and/or H&S supervisor.
- In the event of an accident or emergency, notify responsible personnel listed in Section 9.5.1 and Table 9-1.

4.2.4 RESPIRATOR TRAINING

Personnel required to wear respiratory protection are required to complete the Respiratory Indoctrination (computer-based training) and fit test for negative pressure respirators. Subcontractors may substitute respirator training which meets the requirements of Occupational Safety and Health Administration (OSHA) 29, CFR 1910.134 and the ANSI standard for Respiratory Protection, Z 88.2 - 1992. If supplied air respirators are to be used, a fit test is required, as well as documented training on the specific equipment.

4.3 EMPLOYEE MEDICAL SURVEILLANCE

Medical surveillance will be conducted in accordance with CFR 1926.65 (f). Medical surveillance must include authorization to work on a hazardous waste site and to wear a negative pressure (and positive

pressure, if Level B is to be used) respirator. Field personnel must have current baseline or annual hazardous waste worker medical surveillance to perform work.

5.0 HAZARD EVALUATION AND CONTROL

The activities covered by this HASP present potential chemical, physical, radiological, environmental, and biological exposure hazards, which may be encountered during the conduct of work at RFETS. The following sections discuss those hazards and means of controlling them.

5.1 HAZARD IDENTIFICATION AND ASSESSMENT

An AHA was performed to identify and assess the hazards specific to each work location and the tasks. Table 5-1 presents an AHA for the tasks involved with implementing the FY96 WARP Work Plan. A summary of suspect contaminants of concern along with well number, location and task description is presented in Table 5-2, Task Specific Hazards and Controls. Table 5-3 presents the Chemical Hazard Summary for each suspect contaminants of concern along with OSHA, American Conference of Governmental Industrial Hygienists (ACGIH), and National Institute for Occupational Safety and Health (NIOSH) exposure limits for each contaminant of concern. Table 5-4 summarizes the symptoms and treatment for heat and cold stress. Appendix A presents the monitoring requirements, action levels for increasing PPE, personal monitoring requirements, and PPE required for specific task locations. For ease of employee use, all information is presented in tabular format. The intent of the hazard identification and assessment process is to describe:

- Safety hazards associated with the site's operations (e.g., equipment, processes);
- Hazardous substances, radiological hazards, and other health hazards, involved or expected at the site; and
- Anticipated exposure levels for each job/task.

The Hazard Identification process consisted of a comprehensive review of historical data, a physical review of the site, and a review of the scope of work for the task. The review of historical data may include, but is not limited to, a review of the Historical Release Report, review of pertinent sample data from previous tasks, discussions with RFETS personnel, and technical memorandums. The physical review of the site

Table 5-1 Activity Hazard Analysis – FY96 WARP

Step	Hazard	Controls
(1) Well installation, abandonment, and geotechnical borings	Slips, trips, and falls	Personnel will follow procedures in Section 5.3.6
	Exposure to airborne radioactive and chemical contaminants	Real-time and integrated sampling per subsections of Sections 6.0 and 7.0
	Dermal contact with radioactivity and chemically contaminated soil and water	Personnel will use PPE given in Section 8.0
	Mechanical and hydraulic hazards	Heavy equipment procedures per Section 5.3
	Noise Exposure	Noise monitoring will be conducted and hearing protection provided as needed per Section 5.3.4
	Vehicular and pedestrian traffic	Site control will be maintained per Section 6.0
	Electrical	Clearances will be maintained per Section 5.3
	Underground and aboveground utilities	Utility clearance will be performed per Section 5.3
	Manual material handling	Personnel will follow safe lifting practices per Section 5.3
	Falling objects	Hard hats, steel-toed boots, and safety glasses will be worn per Section 8.0
	Heat stress	Heat stress monitoring per Section 5.7
	Cold stress	Cold stress monitoring per Section 5.7
(2) Equipment Decontamination	Contact with potentially contaminated rinse water	Personnel will use PPE as required by Section 8.0
	Additional hazards as listed in Step 1	Controls as provided in Step 1.
	Radioactive contamination	Screening for release per Section 6.0
	High pressure steam cleaning	Personnel will use PPE as required in Section 8.0

Table 5-2 Task Specific Hazards and Controls – FY96 WARP

Location	Task Description	Potential Contaminants	PPE To Be Used
Wells 24193, 24393, 24993, & 25093 (Trench 3, IHSS 110)	Wells to be abandoned. Grout to be removed conductor casing isolating the alluvium from the underlying bedrock. No soil will be disturbed.	None. Previous BZ air monitoring indicated no hazard while drilling. Additionally, only grout will be removed. No soil will be disturbed.	Start in Level D.
Wells 24093, 24293, 24493, 24593, & 24693 (Trench 3, IHSS 110)	Wells to be abandoned by overdrilling and removing the well casing and annular materials. Some native soil will be disturbed.	Uranium, plutonium, tetrachloroethene, toluene, trichloroethene, carbon tetrachloride, and methylene chloride. Previous BZ air monitoring indicated no hazard while drilling. Analytical data generated during well installation support low levels of volatile organic compound (VOC) contamination in soil (less than 200 µg/kg).	Start in Level D.
Wells 23096, 23196, and 23296 (Buffer Zone wells, not in an IHSS)	New groundwater monitoring wells to be installed along Woman Creek and South Walnut Creek.	None.	Start in Level D.
Wells 22596, 22696, and 22896 (IM/IRA monitoring wells in the IA, not in an IHSS)	New groundwater monitoring wells to be installed.	None.	Start in Level D.
Well 22796 (IA, next to IHSS 172)	New groundwater monitoring well.	None. This IHSS is the result of a spill of one drop every 3-ft of low level radiative liquids along a roadway that did not affect any soil near the proposed monitoring well location.	Start in Level D.
Well 22996 (IA, next to IHSS 164.2)	New groundwater monitoring well.	None. This IHSS is reported as a 5-in. diamter uranium-238 hot spot on a concrete pad, which is not lcoated near the proposed well location. The concrete pad was smeared, showing 650 cpm and 12 – 24 dpm. This was considered low-level uranium contamination which was removable. The contamination was subsequently removed from the concrete.	Start in Level D.
5 geotechnical borings (23596 through 23996, in the 964 Yard of the IA, IHSS 176 and 165)	5 soil borings to collect soil samples for geotechnical testing.	Plutonium. Borings will be drilled in proximity to previous borings that were tested as non-RCRA Hazardous with low levels of plutonium (within background ranges).	Start in Level D.

may include, but is not limited to, a physical walkdown of the site and a review of the task location on site maps. During the physical walkdown of the site, the following conditions will be looked for or at.

- Physical layout and terrain of site;
- Site cleanliness or condition;
- Posting regarding radiological, chemical, or biological hazards;
- Fencelines and access/egress to work area;
- Utility lines which may present logistical obstacles;
- Adjacent areas that may present hazards.

Hazards are created by overhead pipelines, overhead electrical wiring, and building overhangs. Other hazards are created by subsurface utilities and the necessity to perform work in proximity to buildings. In outlying areas, uneven terrain and loose soils create hazards and make drill rig access difficult. The specific tasks covered by the plan are:

- Traveling to and from monitoring well and borehole locations;
- Conducting coring/drilling/abandoning at well locations;
- Data collecting activities;
- Well installation;
- Surface soil sampling;
- Land surveying;

Table 5-3 Chemical Hazard Summary

CHEMICAL	MATRIX	OSHA PEL	ACGIH TLV	NIOSH REL	STEL	CEILING	[redacted]	SKIN NOTATION	CORROSIVE IRRITANT	BOILING POINT °F	VAPOR PRESSURE	FLASH POINT °F	[redacted]	LEL (%)
Ammonia	S	50ppm (STEL)	25 ppm	25 ppm	35 ppm (1)		300 ppm (1)		X	-28 °F	8.5 atm	NA (Gas)	28%	15%
Arsenic	S	0.010 mg/m^3	0.2 mg/m^3	(A)		0.002 mg/m^3 (1)	5 mg/m^3 (1) (A)		X	Sublimes	0 mm	NA	NA	NA
Beryllium	S	0.002 mg/m^3	0.002mg/m^3 (B)	0.0005 mg/m3 (A)		4 mg/m^3 (1) (as Be)	4 mg/m^3 (1) (as Be)			4532 °F	0 mm	NA	NA	NA
Cadmium	S	0.005 mg/m^3	0.01 mg/m^3	(A)			9 mg/m^3 (1) (A)			1409 °F	0 mm	NA	NA	NA
Carbon Tetrachloride	S	10 ppm	5 ppm	(A)	2 ppm (1)	25 ppm (2)	200 ppm (1) (A)	X		170 °F	91 mm	NA	NA	NA
Chloride	S	-		-	-	-	-	-	-	NA	NA	NA	NA	NA
Chromium (Metal)	S	1 mg/m^3	0.5 mg/m^3	0.5 mg/m^3			250 mg/m^3	X	X	4788 °F	0 mm	NA	NA	NA
Cyanide	S	5 mg/m^3	5 mg/m^3				50 mg/m^3 (3)	X	X	2725 °F	0	NA	NA	NA
Hydrochloric Acid	S					5 ppm	100 ppm		X	-121 °F	>1 atm	NA	NA	NA
Lead	S	0.050 mg/m^3	0.15 mg/m^3	0.100 mg/m^3			100 mg/m^3			3164 °F	0 mm	NA	NA	NA
methylene chloride		500 ppm	50 ppm	(A)	2,000 ppm	1,000 ppm	2,300 ppm (A)			104 °F	350 mm	NA	23%	13%
Nitrates	S	-	-			-	-			Varies	Varies	Varies	Varies	Varies
Nitric Acid	S	2 ppm	2 ppm	2 ppm	4 ppm		25 ppm (1)		X	181 °F	48 mm	NA	NA	NA
No. 2 Diesel Fuel	S		100 ppm			5 mg/m^3 (3)	-	X		350-700 °F	0.5 mm @ 20 °C	52 @ 125	7.50%	0.60%
Pentachlorophenol	S	0.5 mg/m^3	0.5 mg/m^3	0.5 mg/m^3	-	-	2.5 mg/m^3 (1)	X		588 °F (Decomposes)	77 °F 0.0001 mm	NA	NA	NA
Phosphate	S	-	-	-	-	-	-		X	NA	NA	NA	NA	NA
PCBs	S	0.5 mg/m^3	0.5 mg/m^3	0.001 mg/m3 (A)			5 mg/m^3 (1) (A)	X	X	689-734 °F	0.00006 mm	NA	NA	NA
Silver	S	0.01 mg/m^3		0.01 mg/m^3			10 mg/m^3 (1)		X	3632 °F	0 mm	NA	NA	NA
Sulfates	S	-	-	-	-	-	-		X	NA	NA	NA	NA	NA
Sulfuric Acid	S	1 mg/m^3		1 mg/m^3			15 mg/m^3 (1)		X	554 °F	0.001 mm	NA	NA	NA
tetrachloroethylene		100 ppm	25 ppm	(A)	100 ppm	200 ppm	150 ppm(A)			250 °F	14 mm	NA	NA	NA
Toluene	S	200 ppm		100 ppm	150 ppm (1)	300 ppm (2)	500 ppm (1)	X	X	232 °F	21 mm	40 °F	7.10%	1.10%
1,1,1 Trichloroethane	S	350 ppm	350 ppm	350 ppm	450 ppm		1000 ppm(1)			165 °F	100 mm	NA	12.50%	7.5
Trichloroethene	S	100 ppm	50 ppm	25 ppm (A)		200 ppm (2)	1000 ppm (1) (A)		X	189 °F	58 mm	NA	10.5% @ 77 °F	8% @ 77 °F

Notes:

Units are as specified in the column headings unless otherwise noted.

(A) NIOSH Identified Carcinogen
(B) ACGIH Carcinogen
(1) NIOSH REL Value
(2) OSHA PEL Value
(3) ACGIH TLV Value

Table 5-4 Symptoms and Treatment of Heat and Cold Stress

Condition	Symptoms	Treatment
Heat stroke	Red, hot dry skin; no perspiration; dizziness; confusion; rapid breathing and pulse; high body temperature.	This is a **MEDICAL EMERGENCY!** Cool victim rapidly by soaking in cool (not cold) water. Loosen restrictive clothing. **Get medial attention immediately!**
Heat rash	Decreased ability to tolerate heat and obvious signs of discomfort.	Move victim to a cool air-conditioned area. Loosen clothing.
Heat cramps	Muscle spasm and pain in the extremities and abdomen.	Move victim to a cool air-conditioned area. Loosen clothing.
Heat exhaustion	Pale, clammy, moist skin; shallow breathing; profuse sweating; weakness; normal temperature; headache; dizziness; vomiting.	Move victim to a cool, air-conditioned area. Loosen clothing, place head in low position. Have victim drink cool (not cold) water.
Frost nip	Characterized by sudden blanching or whitening of skin.	Move victim to a warm area.
Frostbite	Blanched, white, waxy skin, but resilient tissue; tissue cold and pale.	Move victim to a warm area. Warm area quickly in warm (not hot) water. Have victim drink warm fluids - not coffee or alcohol. Do not break any blisters. Elevate the injured area and **get medical attention.**
Hypothermia	Shivering, apathy, sleepiness, rapid drop in body temperature; glassy stare; slow pulse; slow respiration.	Move victim to a warm area. Have victim drink warm fluids - not coffee or alcohol. **Get medical attention.**

- H&S monitoring;
- Personnel decontamination; and
- Equipment decontamination.

This HASP covers a wide variety of hazards known or suspected to exist at RFETS or that are inherent to the process of environmental restoration activities; however, unforeseen hazards may be present in the performance of some tasks. Any hazards not covered by this HASP specifically will be assessed by the HSS for the appropriate control measures to maximize worker, environment, and public safety. These measures will also be discussed and reviewed by the H&S supervisor, RE, or HSS as appropriate.

5.2 PROJECT TASK ANALYSIS

To generate the analysis for the FY96 WARP, the following assumptions were used to qualify the magnitude of the chemical and radiological hazards.

- The work to be conducted under this HASP is in open areas with no impediments to natural ventilation. Exceptions to this assumption include those activities conducted adjacent to buildings.

- Engineering, PPE, and procedural requirements will be followed and enforced to limit radiation exposure to ALARA and chemical exposure not to exceed the levels in Appendix A.

- Inhalation and dermal contact with contaminated particulates resuspended in the atmosphere, either by work conducted under this plan or natural forces, will be the primary routes of exposure for chemical contaminants and alpha radiation. Airborne alpha radioactivity will be sampled during work activities. If sampling results are equal to or greater than 10 percent of the derived-air concentration (DAC) defined in 10 CFR 835 and the RFETS Radiation Control Manual. Actions to be taken will be determined with RE.

- Alpha, beta, and gamma radiation levels will be noted during preactivity surveys. If levels of each type of radiation are within acceptable limits as defined in 10 CFR 835, the RFETS RCM, and the DOE RCM, work will proceed unimpeded. Actions to be taken when unacceptable radiation levels are noted and will be determined in conjunction with RE.

5.3 PHYSICAL HAZARDS

Specific physical hazards and controls associated with individual projects to be performed at this facility are described in Table 5-1, Activity Hazard Analysis. Examples of potential physical hazards associated with field activities at the site may include heavy equipment, electrical, utilities, noise, lifting, slips, trips, and falls, precariously positioned objects, ultraviolet light, improper illumination, use of hand tools, climbing in the drill rig mast, and hoisting and rigging on the drill rig.

5.3.1 Heavy Equipment

Heavy equipment, primarily drill rigs, used onsite is under the direct control of the subcontractor performing the work. The subcontractor is responsible for maintaining the equipment in good working order and operating it safely. All heavy equipment will have audible backup alarms in working condition, moving parts will be guarded, and hydraulics and rigging will be in good condition. Project personnel will not work near equipment judged to be unsafe because of deterioration, missing parts, obvious defects, or improper operation. Project personnel will report any unsafe condition to the H&S supervisor or the site manager. The H&S is responsible for ensuring that the subcontractor promptly corrects reported problems. Drill rig operation will be discussed in daily safety meetings (required by construction management) to include the location of " Kill Switches."

The subcontractor will be responsible for making provisions to ensure the safety of the equipment operator and other personnel operating equipment in areas with steep embankments or unstable ground. Operation of heavy equipment in such areas will be avoided whenever possible.

Drilling activities involve a number of hazards including, but not limited to, the following: injuries from flying debris, being caught in machinery, hydraulic failures, unguarded points of operation, airborne particulates, equipment rollover, and other hazards associated with the transportation and use of drill rigs. Drilling equipment will undergo an OSHA inspection by Kaiser-Hill Safety Personnel before use in the field.

5.3.2 Electrical

All hard-line electrical outlets will require a ground fault circuit interrupter.

5.3.3 Underground and Aboveground Utilities

Utility lines, above and below ground, may present a hazard to team members during field activities. A safe distance (minimum of 15 ft) from overhead lines must be maintained at all times. If overhead lines are encountered, the H&S supervisor, project manager, or construction management will be contacted for

guidance on acceptable clearance distance. However, minimum distances will be determined in accordance with OSHA.

Workers must not rest on any pipelines or place any equipment on the pipelines at any time. The location of utility lines must be determined before digging or drilling. This will be done by construction management. A soil disturbance permit is issued to confirm this. No drilling or digging will take place at any well or borehole locations before identification of underground utility lines in conjunction with an RFETS construction management excavation specialist pursuant to approval of the soil disturbance permit. All lines will be considered live unless proven otherwise.

The following precautions before drilling at a site will help prevent accidental contact with underground electrical lines.

- Visually inspect each site and the surrounding area for light poles, transformers, electrical junction boxes, phone switch boxes, manholes, etc., to identify possible underground cable routes.

- Have qualified persons verify that the site is free of underground cables by maps and instrumentation.

- Discuss potential hazards and actions to be taken with the driller and the crew.

The HSS may take the following precautions before and during drilling to reduce the possible affects of contacting an underground electrical line.

- Ground the drill rig adequately (using a conducting wire attached to the frame of the drill rig and a metallic pole driven into the ground) before beginning any drilling. This will provide a grounding path for the current that does not include the driller or a member of the crew.

- Assess the necessity of providing the crew with adequate insulating protective gear, such as rubber gloves, boots, and mats. The equipment must meet the American National Standards

Institute (ANSI) standards for electrical insulating protective equipment {J6.6-1971 and j6.7-1935(r1971)} and will be inspected for damage before use.

- Ensure that at least one member of the drill crew is trained and certified in standard first aid and CPR.

- Ensure that no person contacts the rig from the ground while drilling without proper insulating gloves and boots or without standing on an insulating mat in an area where underground utilities are likely.

The following actions should be taken if the rig does come in contact with an underground electrical line.

- Do not panic.

- Contact the proper authorities and the H&S supervisor.

- The driller should remain on the operating platform of the rig if possible until the rig is verified to be deenergized by qualified personnel. Do not try to jump off the rig; you may fall back onto an energized piece of equipment.

- Do not attempt to contact the rig from the ground unless proper insulating equipment is used.

- Do not try to " tackle" the driller to remove him from a live electrical circuit. You may become part of the problem instead of part of the solution. If the driller cannot remove himself, pull him away from the rig by a nonconducting lanyard. If he is not using a lanyard, attempt to wrap one around him without contacting him or the rig and pull him away. Another method of removing him is to push him off the rig with a nonconducting piece of material such as a wooden board or a polyvinyl chloride (PVC) pipe.

- Remove injured workers to a safe distance from the rig and administer first aid and cardiopulmonary resuscitation (CPR) (if necessary).

5.3.6 Slips, Trips, and Falls

During the course of the project, hazards that could result in slips, trips, and falls will be present. Examples of slip, trip, and fall hazards include walking in areas with uneven open terrain and areas with trash and clutter or other obstacles. The following subsections detail these hazards and provide the practices to be followed for controlling each type.

Walking and Working in Open Terrain

Typical hazards found in open work areas include:

- Holes, small ditches, and mounds of soil;
- Vegetation clumps;
- Trash and debris;
- Tools and equipment; and
- Ice, snow, mud, or other slippery surfaces.

To prevent injury caused by inadvertent encounters with the above hazards, the following practices shall be followed.

- Upon arrival at a worksite, the area will be inspected to identify tripping or slipping hazards.
- Upon identification, identified tripping and slipping hazards shall be moved, as practical, from the work area or be conspicuously marked.
- Marked hazards will be reviewed with other members of the field crew.

- Good housekeeping with personnel cleaning as work progresses will be practiced to prevent tripping over tools, equipment, or trash.

- Footwear appropriate for site conditions will be worn.

Housekeeping

Daily housekeeping shall be performed to remove trash and clutter. To perform housekeeping duties, the following practices will be performed.

- Work areas and sites shall be kept free of trash and clutter as work progresses through each day.

- The site manager shall schedule weekly or daily housekeeping duties as necessary to maintain work areas and keep the support site free of clutter or trash.
- Building exits, fire extinguishers, electrical disconnects, and breaker boxes shall be maintained free of obstructions. When observed, obstructions shall be removed immediately.

- Chemicals, samples, or other hazardous substances are prohibited within eating and drinking areas.

- Trash containing food or other similarly spoilable refuse shall be bagged and disposed of daily.

- Snow and ice shall be removed daily or more often, as necessary, from steps, walkways, porches, and other areas before the area is used.

5.3.7 Splashes and Spills

Field personnel will wear appropriate PPE as described in Section 8.0 of this HASP to prevent potential dermal exposure to accidental splashes and spills that may occur during drilling and decontamination activities.

As part of site preparation, precautionary measures will be taken to contain spills. Appropriate plant personnel will be notified by the HSS if spills occur as outlined in Section 9.3.

5.3.8 Precariously Positioned Objects

Field personnel will become familiar with the general area and the potential physical hazards that would be associated with debris or objects that may be piled or scattered around the sites. If objects are stacked in an unsafe manner, the HSS will notify the site manager. Field activities will not begin until facility personnel remove or restack the objects in a safe manner.

5.3.9 Illumination

Most tasks will be performed during daylight hours and outdoors. For activities conducted indoors, follow guidance for the proper illumination as required by 29 CFR 1910.120(m).

5.4 CHEMICAL HAZARDS

Table 5-2 lists specific chemical hazards known or suspected to be of concern at each task location. Table 5-3 presents the Chemical Hazard Summary for each suspect contaminants of concern along with OSHA, ACGIH and/or NIOSH exposure limits for each contaminant of concern. Appendix A presents the air monitoring requirements, personal monitoring, and PPE required for specific locations. Any unforeseen chemical hazards encountered during the performance of tasks covered by this HASP will be evaluated by the HSS and H&S supervisor.

5.5 BIOLOGICAL HAZARDS AND CONTROLS

The following biological hazards that may be encountered at RFETS are discussed in this section: (1) poisonous plants, (2) insects and ticks, (3) poisonous snakes, and (4) scorpions.

5.5.1 Poisonous Plants

Poison ivy, may be encountered at RFETS. These plants may be found in low-lying areas, wetlands, ditches, and creeks.

Poisonous Plant Avoidance Procedures

Poison ivy is a vine identified by three or five leaves radiating from a stem. The plant tissues have an oleoresin that is active in live, dead, and dried parts. The oleoresin may be carried through smoke, dust, contaminated clothing, and animal hair.

First Aid for Poisonous Plants

Signs and symptoms of exposure to poisonous plants include redness, swelling, and sometimes intense itching. Blisters form during the subsequent 24-hours. Crusting and scaling occurs within a few days. In the absence of complications, healing is complete in about 10 days. Wash any exposed skin with mild soap and water, but do not scrub the area.

5.5.2 Insects and Ticks

A variety of insects and ticks may be encountered at RFETS. Caution needs to be used when encountering insects and ticks during field activities.

Ants, Bees, Wasps, and Hornets

The stinger of ants, bees, wasps, and hornets may remain in the skin and should be removed by scraping rather than pulling. An ice cube placed over the sting will reduce pain. An analgesic-corticosteroid lotion is often useful. People with known hypersensitivity to such stings should carry a kit containing an antihistamine and epinephrine.

Lyme Disease and Ticks

Lyme disease is an illness caused by a bacterium that may be transmitted through the bite of the deer tick. Not all ticks are infected with the bacterium; however, when an infected tick bites, the bacterium is passed into the bloodstream of the host where it multiplies. The deer tick is commonly found onsite living in grassy and wooded areas.

The illness typically occurs in the summer and is characterized by a slowly expanding red rash that develops a few days to a few weeks after the bite of an infected tick. This rash may be accompanied by flu-like symptoms along with a headache, stiff neck, fever, muscle aches, or general malaise. At this stage, treatment by a physician usually is effective. If left untreated, these early symptoms may disappear but more serious problems may follow. Other problems that may occur include meningitis, neurological abnormalities, and cardiac abnormalities. Treatment of later symptoms is more difficult than early symptoms and is not always successful.

Tick Avoidance—When in an area suspected of harboring ticks (i.e., grass, brushes, and woodland), the following precautions can minimize the chances of being bitten:

- Wear light-colored clothing so ticks can be easily spotted.
- Wear tick repellent.
- Inspect clothing frequently while in tick habitat paying special attention to the insides of seams and cuffs.
- Do not pick up dead mammals.

Inspect your head and body thoroughly for ticks when returning from the field. Removal of ticks is best accomplished using small tweezers. Do not squeeze the tick's body. Grasp the body and tug gently, but firmly, until it releases its hold on the skin. Wipe the bite thoroughly with an antiseptic and seek medical attention if needed.

Spiders

Spiders are generally found in dark protected areas such as access ways to sanitary sewers, under ledges, in protective casings of monitoring wells, pump houses, buildings, portable toilets, and manhole covers. The black widow and brown recluse or violin spiders may be encountered at RFETS. Caution needs to be used when encountering these spiders during field activities.

The black widow spider ranges in color from gray to brown to black, depending on the species. The abdomen is shiny black with a red hourglass or red spots. A spider-bite victim may recall receiving a sharp, pinprick-like bite; but in some cases, **the bite is so minor that it goes unnoticed.** Rarely is there any local skin reaction. The initial pain is sometimes followed by a dull, occasionally numbing pain in the affected extremity, and by pain and cramps in one or several of the large body muscles. Sweating, weakness, and varying degrees of headache and dizziness are common. The lymph nodes in the region of the bite will often be tender or painful. In severe cases, there is rigidity of the abdominal muscles and pain in the lower back, thighs, or abdomen. There is no effective first aid treatment. Treat for shock and transport to the nearest medical facility.

The brown recluse or violin spider has an abdomen that ranges in color from grayish to orange and reddish-brown to dark brown. The back shell of the " violin" is brown to black and distinct from the pale yellow to reddish-brown background of the head and chest. The bite of this spider produces about the same degree of pain as the sting of an ant. In most cases, a localized burning sensation develops that may last for 30 to 60 minutes. The area around the bite often itches, becomes red and warm, with a small blanched area around the puncture wound. The reddened area enlarges and becomes purplish during the subsequent one to eight hours. A small blister forms at the wound, increases in size, and may rupture. The whole area may become swollen and painful. Other signs and symptoms include fever, malaise, stomach cramps, nausea, and vomiting. In severe cases, there may be breakdown of the red blood cells, renal failure, or death. The first-aid procedure for spider bites is to apply ice to the wound and position it, if possible, below the heart level to slow circulation of the venom. The individual should seek medical attention.

5.5.3 Poisonous Snakes

The most frequently observed reptiles at RFETS are bull snakes and rattlesnakes. Eastern yellow-bellied racers have also been seen. Western plains garter snakes are found in and around many of the ponds. Of the mentioned reptiles, rattlesnakes are the only poisonous variety.

The best procedure for avoiding snakes is to be familiar with snake habitat and observant in the field. Snakes can be found under debris, manhole covers, or overgrown vegetation. Be especially careful walking at night or in grass and underbrush. Do not climb rocky ledges before visually inspecting them. Wear boots and heavy pants; more than half of all bites are on the lower parts of the legs. Do not attempt to kill snakes unnecessarily; many people are bitten in such an attempt.

Treat all snakebites as if they may be from a poisonous snake. All reactions from snakebites are aggravated by acute fear and anxiety. The severity of local and general reaction from poisonous snakebites depends on the amount of venom injected and the speed with which venom is absorbed into the victim's circulation, the size of the victim, the protection from clothing, how quickly antivenom therapy can be provided, and the location of the bite.

The extremely painful characteristics of a rattlesnake bite include rapid swelling that can be identified by one or more puncture wounds created by the fangs. The skin is usually marked with general discoloration. Symptoms may include general weakness, rapid pulse, nausea and vomiting, shortness of breath, dimness of vision, and shock.

There are three objectives when administering first aid for snake bites: (1) reduce the circulation of blood through the bite area; (2) delay the absorption of the venom; and (3) prevent aggravation of the local wound and to sustain respiration.

Immobilize the person and the bite wound in a horizontal position. Wash the bite with water, but avoid manipulation of the bite area. Do not allow the person to walk, run, or drink alcoholic beverage or stimulants (i.e., soda or coffee). Do not apply ice or give aspirin. Treat for shock and transport to the nearest medical facility.

5.5.4 Scorpion Avoidance Procedure and First Aid for Stings

Scorpions may also be found at RFETS. The best procedures for avoiding scorpions are to (1) be familiar with scorpion habitat, and (2) be observant in the field. Scorpions can be found under debris, manhole covers, or overgrown vegetation. Be especially careful walking at night or in grass and underbrush. Do not climb rocky ledges before visually inspecting them.

A sting will cause persistent pain, numbness, and tingling. Signs and symptoms may include local pain, rash, redness, blisters, headache, and fever. If the scorpion stinger remains embedded, remove the stinger with tweezers or by scraping with a credit card. Wash the area with soap and water and apply cold packs to the affected area. Treat for shock and transport to the nearest medical facility.

5.6 RADIOLOGICAL HAZARDS AND CONTROLS

Airborne alpha radioactivity will be sampled when indicated, during work activities. If sampling results are equal to or greater than 10 percent of the DAC defined in 10 CFR 835 Appendix A and the RCM. Actions to be taken will be determined. Alpha, beta, and gamma radiation levels will be noted during preactivity surveys. If levels of each type of radiation are within acceptable limits as defined in 10 CFR 835(c) and the RCM, work will proceed unimpeded. Actions to be taken when unacceptable radiation levels are noted will be determined by RE. Appropriate procedures will be followed to ensure the safety of the workers, environment and public from Radiological Hazards. Any radiological concerns not specifically addressed in these procedures will be evaluated by the HSS with the assistance of the RE.

The radiological hazards at RFETS can be characterized in three general categories: (1) radiation, (2) radioactive contamination on surfaces, and (3) airborne radioactivity. Appendix A and the Radiation Work Permit (RWP), if required, details the radiological hazards likely to be present at each project site. These categories of radiation, their health effects, and controls are described below.

5.6.1 Radiation

Radioactive materials (atoms) transform (or decay) to a more stable condition by releasing excess energy in the form of radiation. This radiation is in the form of electromagnetic energy packets or high speed

particles. Electromagnetic radiation commonly present at RFETS are gamma rays and x-rays. High speed particles include neutrons, alpha particles, and beta particles. Exposure to radiation can occur by direct external exposure or by intake of radioactive material into the body.

Radiation may cause biological damage by interacting with cells in the body. The resulting damage to these cells can generally be repaired by the body over time. However, body functions may be impaired or the damaged cells may result in the induction of cancers. The larger the radiation exposure the greater the damage is done to the cells and the more repaired are necessary to prevent the effects described. Because of this, any exposure to radiation is considered to carry the risk of biological damage in proportion to the magnitude of the exposure. The low levels of radiation exposure that RFETS workers experience are considered to be a low risk relative to other occupational hazards.

Direct radiation exposure can be reduced by minimizing the time exposed to the source, increasing personnel distances from the source, and by shielding the source with adequate shielding material. Exposure to radiation from radioactive material on the skin or taken into the body can be reduced by minimizing contact through contaminant at the source, wearing of proper PPE to protect exposed skin surfaces, wearing respiratory protection, and local engineering controls.

5.6.2 Airborne Radioactivity

Airborne radioactivity is radioactive material, usually particulates, suspended in the air. Airborne radioactivity presents a hazard by emitting radiation in the air, depositing on surfaces of the body, and by entering the body through respiration. Internally deposited radioactive material generally presents a higher degree of hazard since damage can be done to specific organs and tissues directly. Alpha particles present no appreciable risk when outside of the body due to the low penetrating power; however, these particles have a large relative risk when inside of the body because of the proximity to tissues.

Level C air purifying respirators with high efficiency particulate air (HEPA) cartridges or Level B supplied air respiratory protection provide protection from airborne radioactive particles depending on concentration.

5.6.3 Surface Contamination

Radioactive material may become distributed on surfaces. When the radioactive material is distributed in undesirable locations, this is referred to as " surface contamination." Radiation exposure from surface contamination can result from direct contact or by transfer of radioactive material to the skin or intake into the body. Work activities that disturb the surface can result in dispersion of the radioactivity in the air with a subsequent risk of intake into the body or spread to skin and other surfaces.

Surface contamination may be categorized into four basic types: (1) loose surface, (2) fixed surface, (3) soil, and (4) underground. Loose surface contamination is radioactive material plated on a surface that may be removed by casual contact or air currents. Fixed surface contamination is radioactive material plated on a surface in a form that cannot be easily removed. Fixed surface contamination requires extraordinary measures to be removed such as sanding, chipping, abrading, or chemical methods. Soil contamination is radioactive material in the soil matrix, usually distributed throughout the soil. Underground contamination is radioactive material that is buried below the ground surface in either a contained or uncontained form.

The health risk of surface radiation may be from direct radiation exposure or from airborne radioactivity. Control surface radiation risk in the same fashion as radiation or airborne radioactivity. Wear appropriate PPE to avoid contact with surface radiation and modify work practices to minimize dust generation from surfaces with surface contamination.

For work covered by this HASP, exposures to radiation, surface contamination, and airborne radioactivity will be maintained ALARA in accordance with 10 CFR 835(B) and the RFETS RCM.

5.7 ENVIRONMENTAL HAZARDS

5.7.1 Heat and Cold Stress

Heat stress monitoring will be conducted by the HSS any time the ambient temperature exceeds 70°F. Work/rest regimes will be determined by following the guidance in the latest edition of the ACGIH Threshold Limit Values (TLVs). Table 5-4 summarizes symptoms and treatment procedures for heat and cold stress.

5.7.2 Inclement Weather

In the event of adverse weather, the shift supervisor will determine whether work can continue without compromising the H&S of site personnel. In addition, the site manager and HSS will determine if further restrictions apply. Adverse weather may include:

- High winds;
- Heavy rainfall or hail;
- Potential for heat stress;
- Potential for cold stress;
- Tornadoes;
- Limited visibility;
- Electrical storms;
- Potential for accidents; and
- Malfunctioning of monitoring equipment.

Storms at RFETS are often fast moving. Field personnel should watch for indications of electrical storms (weather forecasts should be discussed in the daily H&S meeting). The distance to an electrical storm can be estimated by observing the interval between the lightning flash and the sound of thunder. Because sound travels approximately 1,100 feet per second, an interval of five seconds corresponds to a storm distance of approximately 1 mile. If an electrical storm is observed within 3 miles of the site, field personnel should stop outside activities and proceed to the site office for further instructions. If caught in the open during an electrical storm, all personnel will immediately seek shelter in their vehicle and return to the field office. If

vehicles are inaccessible, personnel will move to a topographically low area away from tall objects and conductors (e.g., transformers, power lines, metal sheds) and wait for the storm to leave the area.

Thunderstorms and Tornadoes

Meteorological conditions will be closely watched, especially in the spring when severe thunderstorms and tornadoes are most likely to occur. Tornadoes are usually preceded by severe thunderstorms with frequent lightning, heavy rains, and strong winds.

A severe thunderstorm watch or a tornado watch announcement on radio or television indicates that a severe thunderstorm or tornado is possible. Work will continue at the work site during severe thunderstorm watches or tornado watches (unless wind exceeds standards or lightning has been identified in the area). A severe thunderstorm warning or a tornado warning signifies that a severe thunderstorm or a tornado has been sighted or detected by radar and may be approaching. All work onsite will stop during a thunderstorm, severe thunderstorm warning, or tornado warning.

Personnel onsite during a tornado will take the following steps.

- Evacuate office trailers or vehicles to low-lying areas.
- Stay away from all windows.
- If outdoors, lie flat in a nearby ditch. If no low-lying areas are available, lie down on the ground.
- Stay away from power poles, electrical appliances, and metal objects.
- Do not try to outrun a tornado.

5.8 ERGONOMIC HAZARDS

Cumulative trauma disorders (CTDs) occur most frequently as a result of strain from performing the same task on a continuous basis. The primary risk factors for CTDs are:

- Repetitive motion;
- Excessive force; and
- Awkward position.

Other risk factors include the following:

- Working with vibrating tools;
- Working in a cold environment; and
- Being in poor physical condition.

Take the following actions to prevent CTDs at this worksite.

- Find ways to reduce repetitive motion.
- Find ways to reduce excessive force.
- Neutralize awkward postures that may cause strain and tension by placing the body in a more natural position.
- Consider using power tools instead of hand tools.
- Choose tools with soft-cover grips.

- Select tools with handles designed to keep your wrist in a neutral position.

- Wear gloves that fit correctly. Gloves that are too large or thick may cause you to use excessive force. Gloves that are too tight may restrict circulation.

Any employee exhibiting symptoms of cumulative trauma disorders, including a prickling or tingling sensation in the fingers or pain, loss of sensation, or weakness in a part of the body, should contact the HSS and the H&S supervisor promptly.

5.9 CONFINED SPACE HAZARD

The Activity Hazard Analysis did not identify any tasks that may include confined space entry. If entry into a confined space is necessary, compliance with RFETS Confined Space Entry Program, is required. The HSS should notify the H&S supervisor before starting any tasks requiring confined space entry, obtain the necessary permits, and ensure personnel training.

6.0 SITE CONTROL

Site control to reduce the possibility of employee exposure to potential hazards and the transport of contaminants includes:

- Setting up control points and physical barriers to exclude unnecessary personnel from the general area;
- Minimizing the number of personnel and equipment on site consistent with effective operations;
- Establishing work zones within the site;
- Conducting operations in a manner to reduce the exposure of personnel and equipment and to eliminate the potential for airborne dispersion; and
- Implementing appropriate decontamination procedures.

6.1 WORK ZONES

Clearly delineated work zones help ensure that:

- Site personnel are adequately protected from existing hazards,
- Specific activities and hazards are confined to the appropriate areas, and
- Project personnel may be accurately and quickly located and evacuated during an emergency.

For work areas where the potential exists for exposure to radiation or radioactive contamination, radiological areas (including inside an exclusion zone [EZ]) will be established and posted as specified in Environmental Management Radiological Guideline (EMRG) 1.3, Posting of Radiation Protection Requirements.

The following three contiguous zones will be used where significant contamination potential exists: (1) exclusion zone, (2) contamination reduction zone, and (3) support zone. It is anticipated that these zones will not be required for all activities. The H&S Supervisor may authorize the use of single or no zones depending on: the area's current use, the hazards present, postings, location, and whether the activities will introduce or increase hazards.

6.1.1 EZ

The EZ is the innermost of three concentric areas and is the zone where contamination is known to or could occur. All personnel entering the exclusion zone will wear the prescribed level of protection for the specific site. An entry and exit checkpoint will be established at the perimeter of the zone to regulate the flow of personnel and equipment into and out of the zone. All personnel, equipment, and materials exiting the EZ will be considered contaminated and will undergo decontamination before leaving the site. Materials from potentially radioactive contamination areas must be monitored and released in accordance with EMRG 3.1, EMRG 3.02, and RFET's HSP Manual 18.10, Release of Property/Waste for Conditional and Unrestricted Use. The outer boundary of the exclusion zone will be well marked. The boundary may be modified as necessary.

6.1.2 Contamination Reduction Zone

The contamination reduction zone provides a transitional area between the contaminated and clean areas. The zone serves: to minimize the probability of contamination of the support zone; and as an area for monitoring and decontamination of equipment, supplies, samples, and personnel; emergency first aid; equipment resupply; for preparing samples for laboratories; and as a rest area for personnel.

6.1.3 Support Zone

The support zone is considered a noncontaminated or clean zone. Potentially contaminated personal protective clothing, equipment, and samples are not permitted in this area. Normal work clothes are appropriate here. This zone serves as a medical station and command post, equipment supply center, and administrative center.

6.2 BUDDY SYSTEM

Personnel in contaminated or hazardous areas will work with a buddy who is capable of:

- Assisting his or her partner;
- Monitoring the partner for signs of chemical or other exposures (e.g., heat or cold);
- Periodically verifying the integrity of the partner's PPE; and
- Notifying the HSS if emergency help is needed.

As personnel enter an EZ through the access control point, the HSS will ensure that personnel will employ the buddy system at all times.

6.3 COMMUNICATIONS

Verbal communication at the sites may be impaired by onsite background noise caused by heavy equipment and the use of PPE. Hand signals to be used between personnel within an EZ will be reviewed during tailgate safety meetings conducted before starting work at the individual sites. Communication between on and offsite personnel will be conducted using two-way radios. Specific telephone and digital pager numbers for personnel assigned to individual projects are shown in Section 9 (see Table 9-1).

6.4 SECURITY

Site security is essential to (1) prevent unauthorized, unprotected, or unqualified people from exposure to site hazards; (2) prevent vandalism; and (3) protect established and safe working procedures. Site security will be maintained by:

- Limiting access at control points to authorized and essential personnel;
- Assigning the responsibility for enforcing exit and entry requirements;

- Giving the HSS the authority to approve all visitors to the site; and

- Stopping work immediately if unauthorized personnel attempt to or succeed in accessing the Work Area or EZ. Contact the project manager immediately.

RFETS is a secured DOE facility. Personnel who having completed the badging process must show their badge on the outside, front, upper torso. Unbadged visitors must have an onsite, authorized manager notify the west entrance guard gate to authorize a visit. Unbadged visitors must check in at the West entrance guard station. For entrance into restricted areas where security clearance is required, the project manager will make arrangements for an escort.

6.5 DECONTAMINATION PROCEDURES

6.5.1 Personnel Decontamination

Decontamination procedures will be followed by all personnel exiting an EZ at areas where an EZ is necessary. Under no circumstances (except emergency evacuation) will personnel be allowed to leave the site before decontamination. The H&S supervisor may approve simplification of the procedures in the field when a determination has been made that decontamination procedures are unnecessary.

Chemical Contamination

Personnel decontamination for chemical contamination consists of these steps.

1) Personnel drop off equipment to be decontaminated.

2) Perform gross decontamination (i.e., removal of large contamination deposits from outer clothing by gently brushing or washing).

3) Remove outer boots, if worn, in a manner which minimizes skin contamination. If chemical contamination is indicated, wash outer boots with a nonphosphate detergent and water.

4) Remove and dispose of outer gloves and chemical protective coveralls (if worn).

5) Remove and dispose of inner gloves.

6) Wash hands with disposable wipes or soap and water.

Radioactive Contamination

Personnel with identified radioactive contamination that cannot be readily removed in the field using the techniques described above will be transported to the designated RFETS Occupational Health Facility (see Figure 2-1, Building 122) for decontamination. Decontamination will be performed in accordance with EMRG 2.3, Wounds and Skin Contamination, in consultation with the RFETS RE. An RFETS radiological control technician will be called if an abrasion, cut or puncture wound occurs within a radioactive management area under the control of a RWP.

6.5.2 Heavy Equipment And Vehicle Decontamination

Heavy equipment and vehicle decontamination will be performed at the designated RFETS decontamination pad in accordance with Operating Procedure (OP) FO.04, Decontamination of Heavy Equipment at Decontamination Facilities. Personnel decontamination upon completion of equipment decontamination will be accomplished as described OP FO.12, Decontamination Facility Operations.

6.5.3 Small Equipment Decontamination

Small instruments and equipment will be protected from contamination by draping, masking, or otherwise covering as much of the instruments as possible with plastic, without hindering the operation of the unit. Contaminated equipment will be taken from the drop area and the protective coverings removed and disposed of in the appropriate containers. Any dirt or obvious contamination will be brushed or wiped with a disposable paper wipe. The units can then be taken inside in a clean plastic tub, wiped with damp disposable wipes, and dried. The units will be checked, field calibrated, and recharged, if necessary, for the next day's operation. Decontamination will be performed in accordance with FO.03, General Equipment Decontamination.

6.6 EQUIPMENT RELEASE

Equipment decontamination will be performed as described in Sections 6.3.2 and 6.3.3. Equipment that is used to perform intrusive activities in the field will be sent through the designated decontamination facility before its final release from the plant site. Before rented or leased equipment that has been used in the field is returned, it will be screened for radioisotopes by an HSS, and the results will be furnished to the RE. Sampling and releases for conditional and unconditional use will follow EMRG 3.1, Performance of Surface Contamination Surveys; EMRG 3.02, Survey Requirement for Conditional and Unrestricted Use; and a Property/Waste Release Evaluation (P/WRE) will be prepared by the RE following RFETS procedures for release of property/waste for conditional and unrestricted use.

6.7 WASTE DISPOSAL

Waste generated onsite from field activities can be screened with field equipment so that the PPE, lab waste, field trash and office trash can be disposed of into the onsite landfill with the proper documentation. PPE, lab waste, and field trash generated at RFETS must be segregated from other forms of waste, monitored for release in accordance with EMRG 3.02, Survey Requirements for Conditional and Unrestricted Use, and then disposed of in accordance with FO.06, Handling of Personal Protective Equipment. These types of waste may be temporarily placed in a location designated by the site manager until turned over to the RMRS waste custodian. Office trash may be disposed of at any time in dumpsters provided by RFETS. An effort will be made to participate in any and all recycling programs designated and provided by RFETS.

Derived waste generated in the form of soil drill cuttings from the well proposed in the industrial area for the IM/IRA will be drummed in the appropriate color-coded drums and labeled in accordance with RFETS procedures. Personnel that are packaging derived wastes will be trained waste generators, in accordance with RFETS procedures.

7.0 PERSONNEL AND AIR MONITORING

Ambient air monitoring and personal sampling will be conducted during work under this HASP. Appendix A provides a list of monitoring methods and action levels for specific tasks covered by this HASP.

7.1 DEFINITIONS

The following is a list of terms used for air monitoring in this HASP along with their definitions:

- **BZ** – The area representative of the air that would be inhaled by an individual. Defined as the area bordered by the outside of the shoulders and from mid-chest to the top of the head. Air samples may be taken in the BZ to determine an individual's exposure to airborne hazardous substances.

- **Action Level** – A predetermined concentration or amount of a hazardous substance present in the working area or BZ for ongoing work that will prompt the HSS to upgrade the level of protection of the workers, alter monitoring type or frequency, or increase controls required to complete a task. Action levels are based on sustained readings in the breathing zone.

- **Changing Conditions** – Any change in the working conditions that may result in increased or decreased hazard to the safety of the workers, environment, or public. Some examples of changing conditions could be, but are not limited to, sustained wind shifts, weather changes, change in task that presents new potential for exposures, relocation of work effort, etc.

7.2 AREA AND PERSONNEL MONITORING

Air monitoring maybe required for work activities that have the potential for airborne exposure to contaminants. Air will be monitored during these activities using a screening or direct-reading instrument. Action levels for individual projects are listed in Appendix A.

Upon arrival at the work site, the HSS will take a background reading with the direct reading instruments upwind of the work site. Background readings will be repeated whenever conditions change. Subsequent readings will be taken in the worker's BZ.

Where airborne dust levels present a possible hazard, real-time dust monitoring will be conducted at all work sites to determine background particulate levels and monitor particulate resuspension as work is conducted. Readings will be measured at the worker breathing zone. Particulate contaminants will be monitored by a real-time aerosol monitor as presented in OP FO.01, Air Monitoring and Dust Control. Action levels for dust monitoring are based on a respirable nuisance dust TLV of 5 milligrams per cubic meter (mg/m^3) unless otherwise specified. Action levels are based on the average concentration obtained during a 5-minute sampling period. When the concentration of a toxic particulate in soil is known, and the contaminant is likely to travel through air with the soil, the following formula will be used to establish an action level:

$$AL = \frac{\text{permissible exposure level (PEL) in } mg/m^3}{\text{concentration grams per gram [g/g]) (2)}} = \frac{(10^6)(PEL)}{\text{(conc milligrams per kilog [mg/kg]) (2)}}$$

The number two is a safety factor. The concentration is the concentration of the contaminant in soil. The PEL, TLV, or other recommended exposure limit may be used. The calculated action level or one-half the respirable dust standard, whichever is more protective of the worker's health will be used as the action level. Upon arrival at a site, a background reading will be obtained from an upwind location. Additional measurements will be collected whenever conditions change.

These action levels for dust monitoring will also be used to establish PPE requirements for protection from airborne radioactivity in areas with soil radioactivity concentrations up to 90 picocuries per gram (pCi/g). This is a conservative approach assuming that respirable suspended particulates in a worker's breathing zone have the same specific activity as those in soil. An airborne dust concentration of 2.5 mg/m^3 in an area where the soil concentration is 90 pCi/g can be calculated by this method to be equivalent to 10 percent of the most limiting DAC listed in the RCM and 10 CFR 835 Appendix A. For areas with higher soil concentrations, the dust action levels will be lowered by the ratio of 90 pCi/g to the determined soil concentration.

7.2.1 Action Levels for Suspect Contaminants

Health risk action levels for nonradioactive contaminants are established by individual locations and documented in Appendix 1. Whenever feasible, administrative or engineering controls will be implemented to keep exposures below the action level. In setting the levels for known contaminants for which specific monitoring methods are available, a minimum of one half of the Personal Exposure Limit or ACHIH TLV for a contaminant was used as the action level for Level C protection. Action levels are based on instrument sensitivity and recommended exposure limits. If airborne exposures are unlikely, action levels will be set for a low concentration, with an associated action of "evacuate and re-evaluate" to reflect the unusualness of the occurrence.

Maximum use concentrations for Level C work were determined by multiplying the action level by a respiratory protection factor. A conservative factor of 50 was used for full-face respirators. Additional considerations include availability and service limits of air-purifying cartridges for a given contaminant. Where cartridges are unavailable or contaminant levels exceed service limits, demobilization or transition from Level D to B will be required.

When action levels are reached which, according to Appendix A, require evacuation and reevaluation, site workers must move to an area where direct reading instrumentation shows airborne concentrations are below the action levels of concern. Action levels for evacuation are established based on concentrations that indicate an unexpected condition has developed. The HSS must contact the H&S supervisor to determine further action.

7.2.2 Documentation

All monitoring results and other pertinent actions will be recorded in the HSS logbook or on the appropriate form required by RFETS procedures. In addition, each instrument's name, model, serial number, and site conditions will be recorded once before the first entry of monitoring results.

7.3 PERSONAL SAMPLING

Personal sampling will be conducted only when Level B or C action levels are reached with direct reading instruments or when otherwise noted in Appendix A. Sampling results will be used to determine personnel exposure and revise monitoring requirements. Where mixtures of chemicals are detected, the computational formula for mixed contaminants will be used to assess exposure. Modifications to sampling requirements for detected contaminants will be based on the documented exposure level on a case-by-case basis. Additional information from soil sampling results may also be considered for modifying sampling requirements.

Sampling will be conducted with personal air pumps using solid sorbent or filtration media and NIOSH- or OSHA-approved analytical methods. Analysis will be completed by an American Industrial Hygiene Association accredited laboratory. Appendix A provides a summary of methods to be used at each location. Chain-of-custody (COC) seals and forms will be generated for each sample. Field blanks will also be prepared and will be submitted concurrently with exposed media.

Personal exposure monitoring shall be documented and maintained in an employee's personnel file and in the site project files. Employees monitored shall receive a copy of the sampling results within 15 days of receipt of the results.

7.4 INSTRUMENT CALIBRATIONS AND MAINTENANCE

All instrumentation used to monitor employees' nonradioactive exposures will be calibrated and maintained as directed by the instrument manufacturer. The following guidelines will be used:

1) Instruments will be calibrated before and after use or maintenance in accordance with the manufacturer's instructions. Calibration data will be recorded in an instrumentation calibration logbook. Pertinent information to be recorded includes type of instrument, manufacturer and serial number, calibration standard used and lot number or other unique identifier, initial readings, adjustments made, and final reading.

2) Calibration standards will be traceable to a National Institute of Standards and Technology primary standard or be a recognized primary standard. Copies of calibration standard certificates will be maintained at the project site.

3) Maintenance and calibration of the photoionization detectors (PID) or flame ionization detectors (FID) will follow guidelines presented in OP FO.15, Photoionization Detectors and Flame Ionization Detectors.

Instrumentation used to monitor employees' radioactive exposures will be calibrated and maintained by RFETS Health Physics Instrumentation. Daily performance checks will be done as required by applicable sections of Radiological Operations Instructions (ROI) and EMRG Chapter 6.

8.0 PPE

The purpose of PPE is to shield or isolate individuals from the chemical, physical, radiological, and biological hazards that may be encountered at a hazardous waste site when engineering and other controls are not feasible or cannot provide adequate protection. No single combination of PPE is capable of protecting against all hazards. Therefore, PPE should be used in conjunction with, not in place of, other protective methods, such as engineering controls and safe work practices. Adherence to these controls is vital to keep the rate of exposure as low as reasonable achievable. Engineering and administrative controls are specified in Section 5.0 and Appendix A.

PPE ensembles for waste site activities are defined by the EPA and OSHA. Appendix A summarizes the PPE ensembles that are required for specific projects by work task. PPE levels may be upgraded or downgraded based on the results of direct-reading air monitoring equipment. Appendix A and Section 8.2 summarizes the conditions that require an upgrade or that may indicate that a downgrade is possible. PPE , including respiratory protection equipment, will be inspected, tested, and used as required by RFETS procedures.

PPE has been selected for work at specific locations taking into account the hazards and the type of work activities and temperature extremes unique to each site. The level of PPE required for activities covered by this HASP will be continually reevaluated as fieldwork progresses. It is expected that there will be variations in requirements to meet workers' needs at specific locations.

The H&S supervisor will authorize modifications and announce changes and the justification for those changes at a site safety meeting. The HSS will receive a copy of the PPE requirements. These changes to PPE requirements will be coordinated with the H&S supervisor and RE. Changes to PPE requirements for radiological protection will be documented in a RWP.

8.1 LEVELS OF PROTECTION

This section describes the PPE requirements for the following levels of PPE: Level D, Level D Modified, Level C, and Level B.

8.1.1 Level D and D Modified Protection

The Level D ensemble consists of a basic work uniform and common construction-related PPE that includes a hard hat, steel-toed safety boots, and safety glasses with side shields. Other PPE, such as leather or cotton gloves, are added as necessary. Level D modified adds a limited amount of chemical protection for the skin. Over the work uniform, chemical-resistant overshoes or boots, a chemical resistant suit, and chemical-resistant gloves may be added.

8.1.2 Level C and B Protection

To level D modified, the Level C ensemble adds an air-purifying respirator, chemical protective clothing, and two pairs of chemical-resistant gloves. The ankles, wrists, and seams may be taped. Level B replaces the air purifying respirator with one that provides a supplied air source: either an airline/Cascade System or a SCBA.

8.2 UPGRADING LEVELS OF PROTECTION

Levels of protection will be upgraded or downgraded in response to site conditions. The HSS will inform the H&S Supervisor and/or RE in writing if PPE is downgraded or upgraded from the initial requirement presented in Appendix A.

9.0 EMERGENCY RESPONSE/CONTINGENCY PLAN

The following sections describe pre-emergency planning, emergency equipment and supplies, emergency procedures, emergency response and accident follow-up, evacuation information, contacts, post incident notifications, record keeping, and vehicle accident procedures.

9.1 EMERGENCY PROCEDURES

These sections describe procedures for performing emergency planning, providing emergency equipment and supplies, handling emergency medical treatment, and providing for fire protection and for PPE and other equipment failure.

9.1.1 Pre-Emergency Planning

The HSS or site manager performs the applicable emergency planning tasks before starting field activities and coordinates emergency response with the facility and local emergency service providers as appropriate. The HSS or site manager is responsible for:

- Verifying emergency contacts, hospital routes, evacuation routes, and assembly points;
- Notifying appropriate emergency responders before site mobilization;
- Confirming and posting emergency telephone numbers and route to hospital;
- Posting site map marked with location of emergency equipment and supplies;
- Driving and verifying route to hospital; ensuring employees drive route to hospital;
- Designating one vehicle as the emergency vehicle; placing a copy of this HASP, including the hospital directions and map, inside; keeping keys in ignition during field activities;
- Inventorying and checking site emergency equipment and supplies;

- Establishing emergency signals, evacuation routes, and onsite and offsite assembly points;
- Reviewing emergency procedures for personnel injury;
- Reviewing names of onsite personnel trained in first aid and CPR;
- Reviewing emergency response and post-emergency notification procedures;
- Rehearsing the emergency response plan once, before site activities begin,
- Showing field team members where emergency response equipment is located in the support area; and
- Briefing new workers on the emergency response plan.

9.1.2 Emergency Communication

The following communication methods will be used:

- Two-way radios provided by RMRS allow communication among field teams, the contractor's yard supervisor, and the emergency response services at RFETS.
- Where available, telephones can be used to call for emergency services onsite by dialing extension 2911.
- To improve communication with the field crews and to provide communication with key persons during the daytime and off-duty hours, digital pagers may be used.
- Where verbal communication is limited a vehicle horn or air horn will sound in the event of an emergency.

The following horn signals will be used:

- One long blast (repeated three times with five-second intervals between blasts) indicates that personnel should evacuate area by nearest emergency exit.
- Two short blasts indicate a localized problem that is not dangerous to workers.
- Two long blasts indicate all is clear.

The following visual hand signals will be used:

- Clutching throat: personal distress; and
- Arm waving in a circle over the head: if given in the EZ, need assistance; if given in the support zone (SZ), evacuate.

When calling extension 2911 for an emergency response, by telephone or radio, report the following information:

- Name and association;
- Location;
- Type of emergency;
- Time of incident; and
- Type of first aid or response rendered.

Caller does not hang up until the emergency responder has received complete emergency response information.

An immediate verbal report must be given to the H&S supervisor and the project manager, who must notify the RMRS H&S manager and the RMRS vice president of ER within 24-hours of each incident involving medical treatment. The following information will be provided:

- The exact location of the incident;
- Name and employer of victim(s);
- Nature and extent of injuries; and
- Whether victim(s) was transported offsite for medical treatment.

9.1.3 Emergency Equipment and Supplies

The following emergency equipment and supplies will be kept onsite:

- Twenty-pound A:B:C fire extinguisher (or equivalent);
- Industrial first aid kit (10-unit minimum);
- One-way breathing shield for CPR;
- Stretcher or blanket;
- Water and electrolyte replenishers (e.g., Gatorade®);
- Two-way radio(s) or cellular phone;
- Wind direction indicator;

- Portable pressurized eyewash; and

- Sorbent material or spill containment supplies.

The HSS will determine when optional equipment is required.

9.1.4 Emergency Medical Treatment

If a medical emergency occurs, the HSS or site manager shall assume charge until an ambulance arrives, or until the injured person is admitted to the emergency room.

Site personnel will prevent further injury by taking the actions listed below:

- If certified, initiate first aid and CPR if needed. Refer to Section 9.2.1 for information on exposure to bloodborne pathogens.

- Call RFETS ambulance and hospital as appropriate.

- Determine whether decontamination will make injury worse. If yes, seek medical treatment immediately.

- Make certain the injured person is accompanied to the emergency room by at least one field team member with the same employer.

Hospital emergency personnel will be provided with a copy of the HASP. An Authorization for Medical Treatment Form shall be taken with the injured employee to the medical facility. The top portion of the form is completed by the HSS or site manager, and the bottom portion is completed by the doctor at the medical facility.

9.1.5 Transport to Medical Facility

In most cases, an ambulance will transport a seriously injured worker to the medical facility. However, if it becomes necessary to transport the worker, follow proper first-aid guidelines for moving an injured person. Figure 2-1 shows the layout of the streets and buildings at RFETS. The medical center is located in Building 122. There are directions to the center from three site entrance points:

1) Contractor's trailer compound, head north to Central Avenue. Turn left onto Central Avenue and proceed approximately 1.25 miles. Building 122 is on the left.

2) Eastern entrance of the plant, proceed approximately 3.5 miles on Central Avenue. Building 122 is on the left.

3) Western entrance of the plant, proceed along the entrance road through a second guard building onto Cactus Avenue. Proceed on Cactus Avenue one street beyond Second Street and turn left. (This unmarked street is Third Street.) Follow Third Street to Building 122, which is on the left following Building 125.

9.1.6 Fire

On notification of a fire onsite, all site personnel will assemble at the decontamination line. The fire department will be alerted, and all personnel will move to a safe distance from the involved area.

9.1.7 PPE Failure

If any site worker experiences a failure or alteration of PPE, that person and his or her buddy will immediately leave the exclusion zone through the decontamination line. Reentry will not be permitted until the equipment has been repaired or replaced.

9.1.8 Other Equipment Failure

If any other equipment onsite fails to operate properly, notify the HSS, who will determine the effect of this failure on continuing operations onsite. If the failure affects the safety of personnel or prevents completion of the work plan tasks, all personnel will leave the exclusion zone until the situation is evaluated and appropriate actions are taken.

9.1.9 Evacuation

If an evacuation is necessary, use the following steps:

- Personnel are to leave the work location (upwind) and assemble at a designated assembly point (if safe) after detecting the emergency signal for evacuation.

- If an emergency situation is of concern to RFETS personnel, notify the HSS, who will notify the appropriate RFETS contact(s) of the emergency (see Section 9.5.1).

- If appropriate and safe, the HSS and a "buddy" are to remain at or near the sampling location after the location has been evacuated to assist local responders and advise them of the nature and location of the incident.

- The HSS or designee is to account for field team members at the assembly point.

- The HSS or site manager is to complete an incident report (as described in Section 7.2) as soon as possible after the occurrence.

Evacuation routes and assembly points will be documented by the HSS or site manager during the employee health and safety briefing and daily tailgate meetings.

9.2 EMERGENCY RESPONSE AND ACCIDENT FOLLOW-UP

Reporting and notification of emergency situations will be carried out in accordance with requirements in DOE 5484.1.

The HSS or project manager should be prepared to provide the following information:

- HSS name;
- Project manager's name;
- Project name and project number;
- Exact location of incident;
- Name and employer of victim(s);
- Nature and extent of injuries;
- Whether victim(s) was transported offsite for medical treatment; and
- Telephone number where the HSS can be contacted during next 24-hours.

Refer to Section 9.2.2 for RFETS reporting procedure and 9.5.2, Project Managers Investigation.

9.2.1 Exposure to Bloodborne Pathogens

Use the following procedures if a potential exposure to bloodborne pathogens occurs:

- The first aid responder must use universal precautions (i.e.: latex gloves, one-way CPR mask).

- A Hepatitis B vaccination must be offered to all employees who have occupational exposure to blood or other potentially infectious materials.

- The HSS or site manager must be notified immediately during the work shift when a first aid incident occurs.

- The report shall include the names of all first aid providers who rendered assistance, regardless of whether PPE was used, and shall describe the first aid incident, including time, date, and type of PPE used.

The description must include a determination if, in addition to the presence of blood or other potentially infectious material, an "exposure incident" (as defined by 29 CFR 1910.1030) occurred.

9.2.2 RFETS Reporting Procedure

The project manager will submit the completed DOE Form 5484.1, Environmental Protection, Safety and Health Protection Information Reporting Procedures, to the RMRS H&S manager for any of the following incidents:

- Recordable occupational injury or illness as defined below:

  - **Occupational Injury**—An occupational injury is any injury such as a cut, fracture, sprain, or amputation that results from a work accident or from an exposure involving a single incident in the work environment and requires treatment in excess of first aid. Note: Conditions resulting from animal or insect bites, or one-time exposure to chemicals, are considered to be injuries.

  - **Occupational Illness**—The occupational illness of an employee is any abnormal condition or disorder, other than one resulting from an occupational injury, caused by exposure to environmental factors associated with employment. This category includes acute and chronic illnesses or diseases that may be caused by inhalation, absorption, ingestion, or direct contact with a toxic material.

- Property damage losses include losses of $1,000 or more. Accidents that cause damage to DOE property, regardless of fault, or accidents where DOE may be liable for damage to a second party, are reportable if damage is $1,000 or more. This category includes damage to facilities, inventories, equipment, and properly parked motor vehicles and excludes damage resulting from a DOE reportable vehicle accident.

- Government motor vehicle accidents are reported as accidents resulting in damages of $500 or more. Accidents resulting in damages of $500 or more, or that involve an injury, are reported unless the government vehicle is not at fault, damage of less than $500 is sustained by the government vehicle, or no injury is inflicted on the government vehicle occupants. Accidents are also reportable to DOE if the following applies:

  - Damage to DOE property is greater than or equal to $500, and the driver of a government vehicle is at fault.

  - Damage to any private property or vehicle is greater than or equal to $500, and the driver of a government vehicle is at fault.

  - Any person is injured, and the driver of a government vehicle is at fault.

9.3 SPILL OR RELEASE PROCEDURES

Project personnel will be briefed on the RFETS spill or release procedures. For all releases, notify the HSS and project manager immediately. For incidental releases, take the following actions if you know how to deal with the spill safely; that is, you understand the hazards, the situation, and proper PPE and supplies to contain and clean up the release:

- Stop the source of the release

- Warn others of the release and notify supervision

- Isolate the area to prevent traffic through the release, and

- Minimize exposure to the hazards.

If the emergency involves responding to a unknown or hazardous release, dial 2911 to notify the RFETS Hazardous Materials (HAZMAT) Team and then contact the shift supervisor at extension 2914 to report the release. Report your name, company, your telephone number, the location of the occurrence, the time, and the nature and seriousness of the event.

9.4 VEHICLE ACCIDENT

The HSS and site manager shall be promptly notified of any accidents involving vehicles at the facility. The site manager will be responsible for notifying RFETS. Follow the actions of section 9.2.2 if any personnel are injured in the accident.

9.5 EMERGENCY RESPONSE CONTACTS

DO NOT CALL EMERGENCY RESPONDERS WHO ARE NOT ONSITE. THEY WILL NOT BE ALLOWED TO ENTER THE PLANT.

This section lists the emergency contacts and describes the location of the nearest emergency medical facility. For onsite emergency response, use the RMRS-supplied hand-held radio and dial 2911. The radio transmission will automatically contact the RFETS security force, fire department, ambulance, occupational health department, and the contractors yard supervisor. If a radio is not available, use an onsite or mobile telephone. Telephones are available at all guard posts and most buildings onsite. Dial extension 2911 or (303) 966-2911, which is the RFETS emergency telephone number.

9.5.1 Contacts for Emergencies

Reporting procedures include notifying the primary contacts listed in Table 9-1. The HSS will verify the telephone numbers listed on Table 9-1.

Table 9-1 Emergency Contact Telephone and Pager Numbers

Department/Individual	Telephone Number
Fire	(303) 966-2911
Ambulance	(303) 966-2911
Poison Center	(303) 629-1123
Security	(303) 966-2911
Police	(303) 966-2911
Occupational Health General Information	(303) 966-2594
NEAREST TELEPHONE IS AT: T891E	
NEAREST EMERGENCY MEDICAL SERVICES ARE LOCATED AT:	**Building 122**
Vice President – Environmental Restoration – Alan Parker	x4163/d6150
H&S Manager – Ken Jenkins	x5374/d7455
Project Manager – Rob Smith	x7898/d5135
Project Manager/Site Manager – Steve Joliat	x4401/d5470
H&S Supervisor – Peggy Schrekengast	x6790/d3059
H&S Supervisor – Tonya Sangaline	x5392/d3052
HSS – Harold Sanchez	x4953
T3 Technical Support – Mark Wood	x6689/d5904
IM/IRA Technical Support – Tracey Spence	x4322/d6152
Geotechnical Borings – Roy Dearen	x6913/d7446
Tier II Wells – Steve Singer	x3387/d3841
HAZMAT Emergency Response	x2911
Note: d = digital page The digital page number can be reached on plantsite by dialing 4000..	

9.5.2 Project Manager's Investigation

An initial accident investigation will begin at the discretion of the project manager. At a minimum, the scene will be secured (no movement of material or equipment will be made until a review of the accident is completed), and signed statements from witnesses will be maintained.

10.0 RECORD KEEPING

Records documenting the safety program will be maintained. Logs and records will include documentation of exams, training, medical information, safety meetings, injuries, illnesses, and emergency events. Record keeping in the field includes maintaining a H&S logbook and calibration logs.

10.1 HSS' LOGBOOK

A H&S logbook and sign in/sign out log will be maintained by the HSS throughout a project and given to the project manager after the project is completed where the logbook will be maintained in the project files. Logged information will include:

- Names of all personnel entering and leaving the site each day;
- Names and employers of crew members;
- Daily listing of data collection in site numbers to be visited by field teams;
- Description of unforeseen hazards and steps taken to mitigate hazards;
- Weather conditions;
- Instruments to be used that are not listed on data forms to be completed;
- Location of work sites;
- Status of work zones;
- Unforeseen hazards and steps taken to mitigate hazards;
- Safety infractions at the work site, if any;
- Accidents and injuries at the work site, if any;
- Any contact made with RFETS representatives for H&S;
- Any problems with facility personnel; and
- Pertinent data from the performance of the tasks accomplished;
- Summary of telephone conversations regarding H&S;
- Safety infractions, if any;
- Accidents and injuries; and
- All other significant H&S items.

When site safety meetings are conducted, an attendance sheet must be kept.

10.2 CALIBRATION RECORDS

Calibration records for instruments used to monitor employee contaminant exposures will be maintained in a calibration log. Refer to Section 7.4 for an explanation of contents and procedures.

10.3 MEDICAL MONITORING RECORDS

The HSS is responsible for verifying required training, medical monitoring, and maintaining auditable copies of the records at RFETS. This information can be verified on the Readiness Review (RR) training matrix and Medical Surveillance Certification Card carried by the employee. Employees will have access to those records in accordance with 29 CFR 1910.120(f).

11.0 BIBLIOGRAPHY

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Site Location and Description

Location: Wells 22596, 22696, and 22896

Description: Well Installations in the Industrial Area for the IM/IRA. Locations are outside of known IHSSs, with no known contaminants

Suspect Contaminants:

MONITORING REQUIREMENTS			ACTION LEVELS IN BZ				Notes
Contaminant	PEL	Instrument	Range	Level D Modified	Level C	Level B	
Hydrocarbons	—	PID	0 – 2000 ppm	0 ppm	NA	*	*Any sustained reading above background in the BZ
Particulates	10 mg/m^3	MIE Miniram	.1 – 100 mg/m^3	0 – 2.5 mg/m^3	-1	-1	

Personal Monitoring:

Contaminant	Analytical Method

Personal Protective Equipment:

Type of Work	Level D	Level D Modified	Tyvek Coveralls	Saranex Coveralls	Nitrile Gloves	Silvershield Gloves	Latex Gloves	Face Shield	Rubber Apron	Full-Face Respirator
Well Installation	X		X		X		X			HEPA Only
Radiation Survey	X									
Other: Decontamination	X		X		X		X	X		

Notes:

PEL = Permissible Exposure Limit
PID = photoionization detector
ppm = parts per million
DAC = derived-air concentration
HiVol = high volume
mg/m^3 = milligrams per cubic meter
PPE = personal protective equipment
RAD = radiation
N/A = not applicable
NIOSH = National Institute for Occupation Safety and Health

Site Location and Description

Location: Wells 22796 and 22996 and geotechnical borings 23596 through 23996

Description: Well Installations in the Industrial Area for the IM/IRA. Geotechnical Borings in IHSSs 165 snf 176. Potential for U-238 and Pu-239/240 contaminants.

Suspect Contaminants:

MONITORING REQUIREMENTS			ACTION LEVELS IN BZ				
Contaminant	PEL	Instrument	Range	Level D Modified	Level C	Level B	Notes
Hydrocarbons	—	PID	0 – 2000 ppm	0 ppm	NA	*	*Any sustained reading above background in the BZ
Particulates	10 mg/m^3	MIE Miniram	.1 – 100 mg/m^3	0 – 2.5 mg/m^3			
Radionuclides	varies	Hi Vol	-------	< 0.1 DAC	-------	--------	

Personal Monitoring:

Contaminant	Analytical Method

Personal Protective Equipment:

Type of Work	Level D	Level D Modified	Tyvek Coveralls	Saranex Coveralls	Nitrile Gloves	Silvershield Gloves	Latex Gloves	Face Shield	Rubber Apron	Full-Face Respirator
Well Installation	X		X		X		X			GMC-H Type
Radiation Survey	X									
Other: Decontamination	X		X		X		X	X		

Notes:

PEL = Permissible Exposure Limit
PID = photoionization detector
ppm = parts per million
DAC = derived-air concentration
HiVol = high volume
mg/m^3 = milligrams per cubic meter
PPE = personal protective equipment
RAD = radiation
N/A = not applicable
NIOSH = National Institute for Occupation Safety and Health

Site Location and Description

Location: Wells 23096, 23196, and 23296

Description: Well Installations along Woman Creek and South Walnut Creek, no known contaminants

Suspect Contaminants:

MONITORING REQUIREMENTS			ACTION LEVELS IN BZ				Notes
Contaminant	PEL	Instrument	Range	Level D Modified	Level C	Level B	
Hydrocarbons	—	PID	0 – 2000 ppm	0 ppm	NA	*	*Any sustained reading above background in the BZ
Particulates	10 mg/m^3	MIE Miniram	.1 – 100 mg/m^3	0 – 2.5 mg/m^3	-1	-1	

Personal Monitoring:

Contaminant	Analytical Method

Personal Protective Equipment:

Type of Work	Level D	Level D Modified	Tyvek Coveralls	Saranex Coveralls	Nitrile Gloves	Silvershield Gloves	Latex Gloves	Face Shield	Rubber Apron	Full-Face Respirator
Well Installation	X		X		X		X			GMC-H Type
Radiation Survey	X									
Other: Decontamination	X		X		X		X	X		

Notes:

PEL = Permissible Exposure Limit
PID = photoionization detector
ppm = parts per million
DAC = derived-air concentration
HiVol = high volume
BZ = Breathing Zone
mg/m^3 = milligrams per cubic meter
PPE = personal protective equipment
RAD = radiation
N/A = not applicable
NIOSH = National Institute for Occupation Safety and Health

Site Location and Description

Location: 24193, 24393, 24993, and 25093

Description: Wells previously abandoned in IHSS 110. Potential contaminants include: carbon tetrachloride, TCE, PCE, U-238, Pu-239/240, and grout dust.

Suspect Contaminants:

MONITORING REQUIREMENTS			ACTION LEVELS IN BZ				
Contaminant	**PEL**	**Instrument**	**Range**	**Level D Modified**	**Level C**	**Level B**	**Notes**
Volatile Organic Compounds		PID	0 – 2000 ppm	0 ppm	NA	*	*Any sustained reading above background in the BZ
Carbon Tetrachloride	2 ppm	*Sensidyne Colorimetric Tube				> 1 ppm	
Tetrachloroethene (PCE)	25 ppm	*Sensidyne Colorimetric Tube				> 12 ppm	
Nuisance Dust	10 mg/m^3	MIE Miniram	0.1 – mg/m^3	0 – 2.5	>2.5mg/m^3		

Personal Monitoring:

Contaminant	Analytical Method	Notes
Chlorinated Hydrocarbons	NIOSH 1003	If level B/C action levels reached

Personal Protective Equipment:

Type of Work	Level D	Level D Modified	Tyvek Coveralls	Saranex Coveralls	Nitrile Gloves 11 mil outer	Latex Gloves	Other	Full-face Respirator	Notes
Well Abandonment	X		X		X	X		GMC-H Type	Saranex if body contact w/ free liquids likely; 11 mil Nitrile gloves if
Decontamination	X		X		X	X			

Notes:

PEL = Permissible Exposure Limit
PID = photoionization detector
ppm = parts per million
DAC = derived-air concentration
HiVol = high volume
BZ = breathing zone
mg/m3 = milligrams per cubic meter
PPE = personal protective equipment
RAD = radiation
N/A = not applicable
NIOSH = National Institute for Occupation Safety and Health

Site Location and Description

Location: 24093, 24293, 24493, 24593, and 24693

Description: Wells will be abandoned in IHSS 110. Potential contaminants: carbon tetrachloride, methylene chloride, toluene, TCE, PCE, U 238 and Pu 239/240

Suspect Contaminants:

MONITORING REQUIREMENTS			ACTION LEVELS IN BZ				
Contaminant	PEL	Instrument	Range	Level D Modified	Level C	Level B	Notes
VOCs		FID or PID	0 – 2000 ppm	0 ppm	NA	*	*Any sustained reading above background in the BZ
Carbon tetrachloride	2 ppm	*Sensidyne Colorimetric Tube				> 1 ppm	
Tetrachloroethene (PCE)	25 ppm	*Sensidyne Colorimetric Tube				> 12 ppm	
Methylene Chloride	2 ppm	*Sensidyne Colorimetric Tube				> 25 ppm	
Particulates							

Personal Monitoring:

Contaminant	Analytical Method	Notes
Chlorinated Hydrocarbons	NIOSH 1003	If level B action levels reached

Personal Protective Equipment:

Type of Work	Level D	Level D Modified	Tyvek Coveralls	Saranex Coveralls	Nitrile Gloves 11 mil outer	Latex Gloves	Other	Full-face Respirator	Notes
Well Abandonment and decon	X		X		X	X		GMC-H Type	Saranex if body contact w/free liquids likely; 11 mil Nitrile gloves if

Notes:

PEL = Permissible Exposure Limit
PID = photoionization detector
ppm = parts per million
DAC = derived-air concentration
HiVol = high volume
BZ = breathing zone
mg/m3 = milligrams per cubic meter
PPE = personal protective equipment
RAD = radiation
N/A = not applicable
NIOSH = National Institute for Occupation Safety and Health